89-3-7/30

LEBEDEV R.M.

AUTHORS: Bogachev, N. P., Van Shu-Fen', Gramenitskiy, I. M., Kirillova, L. F., Lebedev, R. M., Lyubimov, V. B., Markov, P. K., Merekov, Yu. P., Podgoretskiy, M. I., Sidorov, V. M., Tolstov, K. D., Shafranova, M. G.

TITLE: The Interaction of 9 Bev Protons With Nuclei in Photo-Emulsion (Vzaimodeystviye protonov s energiyey 9 Bev s yadrami foto-emul'sii)

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 3, pp. 281 - 284 (USSR)

ABSTRACT: The photoemulsion НИКФИ-Р with a layer of about 450 μ was irradiated with protons within and out of the vacuum chamber of the 9 Bev synchrophasotron. The mean range of 9 Bev protons for an interaction is 34,7 ± 1,5 cm.(The scattering for angles below 5° was not taken into account). 258 cases of a nuclear interaction were observed. The mean number of fast particles n_s generated in a process of interaction amounts to 3,4 ± 0,1. The angular distribution of these particles shows a clearly preferred forward motion. The mean number of black and grey traces N_n - the recoil nuclei

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The Interaction of 9 Bev Protons With Nuclei in Photo-Emulsion

89-3-7/30

not being considered - is 8,3 ± 0,5.
From 249 found stars 18 can be considered to constitute an interaction of the initial protons with "free" or "quasi-free" protons.
13 stars can be considered to represent an interaction between protons and "quasifree" neutrons. All of them have an odd number of traces, and in the point of formation of the star β-traces can be observed. The mean number of fast particles in these 13 star traces is 3,1 ± 0,3. There are 5 figures, 1 table, and 7 references, 1 of which is Slavic.

SUBMITTED: December 16, 1957

AVAILABLE: Library of Congress

1. Photoemulsions-Proton irradiation 2. Vacuum chambers-Applications
3. Particles-Distribution

Card 2/2

LeBeDev, R. M.

21 (8)

AUTHORS: Barashenkov, V. S., Belyakov, V. A., Van Shu-fen', Glagolev, V. V., Dolkhashav, N., Kirillova, L. F., Lebedev, R. M., Mal'tsev, V. M., ~~Markov, F. K.~~, Tolstov, K. D., Tsyganov, E. N., Shafranova, M. G., Yao Ch'ing-hsieh

SOV/89-7-4-12/28

TITLE: The Interaction of Fast Nucleons With Nuclei of the Photo-emulsion NIKFI-R

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr 4, pp 376-377 (USSR)

ABSTRACT: The present paper deals with the interaction between 9 Bev-protons, which were accelerated in the beam of the synchro-phasotron of the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research), and the nuclei of a photoemulsion of the NIKFI-R type. The results of these measurements are shown by a table. On the basis of the data thus found it is possible to draw several conclusions as to the mechanism of the interaction between a fast proton and a nucleus. If the primary nucleon-nucleus collision is an interaction between nucleon and channel, the velocity of the center of mass in an interaction of silver and bromine with the channel will be considerably less than in an interaction with light nuclei. Therefore, also the number of s-particles

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must be considerably greater. In the experiment, the numbers of s-particles for light and heavy nuclei are, however, nearly the same. This is explainable on the basis of the cascade mechanism of interaction, in which the energy of the s-particles decreases rapidly in cascade collisions. The multiplicity of the particles produced decreases simultaneously. In the case of the greater number of g-particles, nucleons are concerned, which may be explained by the cascade mechanism of nucleon - nucleus interaction. Also the agreement between the transversal momentum p_{g+p} for g-protons originating from interactions with light and heavy nuclei points in the direction of the inter-action cascade mechanism. Besides, a search was made for strange particles by employing the method of investigating according to areas. The cross section of the production of k^+-particles with an energy of $E \leqslant 140$ Mev in a medium-weight nucleus of the photoemulsion amounts to $(5 \pm 2)10^{-27}$ cm^2. Besides, the amount of the production cross section, the wide angular distribution of the k-mesons, as well as other facts indicate that a noticeable fraction of

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slow strange particles is produced in an intranuclear cascade process. Furthermore, the medium-weight energy losses of a fast nucleon are evaluated in the case of a single nucleon-nucleon collision. A 9Bev-proton gives up an average of (5.1 ± 0.8) Bev to a medium-weight nucleus of the photoemulsion, which amounts to (60 ± 10) % of its initial energy. 4.05 Bev are used for the production of pions, and 1.05 Bev are transferred to the nucleons of the nucleus. As a proton in an medium-weight nucleus undergoes approximately 2 collisions, the proton, in one single nucleon-nucleon collision, loses $\Delta E = 35 \pm 10$ % of its initial energy. By means of other measurements of the pion energy spectrum carried out independently of the present paper in a nucleon-nucleus collision $\Delta E = 40 \pm 10$ % is obtained. The statistical theory of multiple production furnishes $\Delta E = (40 - 50)$ %. The authors thank G. Bezzogikh, V. Vakelin, Z. Kuznetsova, and N. Kotkina for their help in the measurements, and L. Popova for his assistance in analyzing measuring results. There are 1 table and 1 reference.

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R000929020014-4"

84388
S/056/60/039/004/006/048
B004/B070

24.6900
AUTHORS: Belyakov, V. A., Van Shu-fen', Glagolev, V. V., Dalkhazhav, N., Lebedev, R. M., Mel'nikova, N. N., Nikitin, V. A., Petrzhilka, V., Sviridov, V. A., Suk, M., Tolstov, K. D.

TITLE: Inelastic Interactions of 7 Bev π⁻-Mesons and Nucleons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 4(10), pp. 937-947

TEXT: The inelastic interaction of 7-Bev π⁻-mesons with nucleons is studied in this paper. The preliminary results were communicated to Kiyevskaya konferentsiya po fiziki vysokikh energiy (Kiyev Conference on the Physics of High Energies). The emulsion chamber consisted of 240 НИКФИ-Р (NIKFI-R) layers with a thickness of 400μ. 5300 interactions with the nuclei of photoemulsion were observed. Of these, 535 inelastic interactions were analyzed (Table 1). The theoretical distribution of the charged particles was calculated by V. S. Barashenkov. Spurious scattering was eliminated by special measurements (Table 2). 459 pions and 134 protons

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Inelastic Interactions of 7 Bev π^--Mesons and Nucleons

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were identified. The angular distribution of pions and the total distribution of all stars (in c.m.s.) are shown in Fig. 1. For smaller number of charged particles, the asymmetry increases strongly. This is principally due to pions with large momenta (Fig. 2). Therefore, the angular distributions are very different for fast and slow pions (Fig. 3). Pions with momenta < 0.5 Bev show an almost isotropic distribution. From the angular and total distributions of protons (Fig. 4) it is seen that the protons conserve their initial direction. From the momentum distributions of pions and nucleons, the authors conclude that the average momentum of the nucleons and of the charged pions does not depend on the increase of the number of charged particles. The same result follows from the data for the average transverse momenta $\bar{p}_\perp$ of protons and pions given in Table 3. Fig. 7 shows the number of neutral mesons as a function of the number of charged particles. The results can be interpreted only partly by the statistical theory. The asymmetry of the angular distribution of the secondary pions can only be explained by a peripheric collision of the pion with a pion of the nucleon shell (Figs. 8 and 9). An estimate of the radius of the nucleon core gave the

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LEBEDEV, R.M

81391

S/056/60/039/004/009/048
B004/B070

24.6900

AUTHORS: Van Shu-fen', Vishki, T., Gramenitskiy, I. M., Grishin, V. G., Dalkhazhav, N., Lebedev, R. M., Nomofilov, A. A., Podgoretskiy, M. I., Strel'tsov, V. N.

TITLE: Inelastic Interactions of 9 Bev Protons With Nucleons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 4(10), pp. 957-960

TEXT: In an earlier work (Ref. 1), the authors carried out the identification of particles and the measurement of their energies only for slow particles. In the present work, the study of pp and pn interactions is continued under conditions permitting the measurement of multiple scattering of fast particles. An НИКФИ-Р (NIKFI-R) emulsion pile was irradiated by 9-Bev protons from the proton-synchrotron of the authors' institute. The inelastic pp (161 events) and pn (94 events) interactions were selected according to the criterion described in Ref. 1. The average number of charged particles in pp interactions was 3.25 ± 0.10

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and in pn interactions 2.58 ± 0.14. The identification was made according to Ref. 3 by means of the function $g/g_0 = f(p\beta)$ for pions and protons. The identification was not certain in the range ($1.5 \leqslant p\beta \leqslant 2.5$ Bev/c) where the curves for protons and pions intersected one another (Table 1). The angular distribution of the secondary protons (in c.m.s.) from pp interactions was strongly anisotropic; the same was true for the pions (Fig. 2). The momentum distribution is shown only for the protons emitted backwards (Fig. 3), because due to spurious scattering only the lower limit of $p\beta$ could be determined for forward emission. Fig. 4 gives the angular distribution of protons in pn interactions. Since there is no difference in the values of angular distribution and energy for pp and pn interactions, the authors treat the two together for higher statistical accuracy. The values of $\bar{p}$, $\bar{p}_\perp$, and $\bar{E}$ for protons and pions are given in Table 2 for lower (n = 2,3,4) and higher (n = 5,6,7) multiplicities. The values of $a = \sqrt{\overline{p_\perp^2}/2}$ for the lower and higher multiplicities are given in Table 3. The data show that the character of the interaction is only slightly affected by the number of the secondary charged particles.

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The authors thank D. I. Blokhintsev and V. I. Veksler for discussions. There are 4 figures, 3 tables, and 7 references: 6 Soviet and 1 US.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: May 12, 1960

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S/053/60/070/02/009/016
B006/B007

AUTHORS: Lebedev, R., Smorodinskiy, Ya., Tyapkin, A.

TITLE: The Physics of Elementary Particles 79

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 361-374 (USSR)

ABSTRACT: The authors give a report on the International Conference on High Energy Physics held at Kiyev in July 1959. This report is interesting above all because of the voluminous material of the work carried out at Dubna (USSR). The Conference was attended by about 150 delegates from Eastern Bloc countries, and by about the same number from other countries. As regards organization, the Conference introduced a novel arrangement which essentially consisted in the fact that "reporters" and "scientific secretaries" were attached to the lecturers, and that the lectures could be heard in Russian and in English. The secretaries were in all cases well-known Russian physicists. Leading physicists acted as chairmen of the plenary sessions; the Russian chairmen were

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The Physics of Elementary Particles

D. I. Blokhintsev and I. Ye. Tamm. Two of the seven holders of the Nobel Prize represented were Russians: I. Ye. Tamm and P. A. Cherenkov. Apart from the surveying lectures seminars were held, in which the following Russian lecturers spoke: I. Ye. Tamm on "Diagram Technique and Field Theory", D. D. Ivanenko on the "Nonlinear Field- and Gravitation Theory", V. P. Dzhelepov on "Nucleon-Nucleon Collisions", and I. V. Chuvilo on "Bubble Chambers". The plenary sessions began on July 20. In the first session Bernardini (CERN) spoke. His scientific secretaries were A. Baldin and A. Belousov (Moscow). The report on the lecture mentions the data obtained at the Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute imeni P. N. Lebedev AS USSR) on the "Polarizability of Protons in (γp)-Collisions". B. Pontekorvo (Dubna) delivered a lecture, which is discussed here in detail, on "Pion Scattering by Nucleons and Production of Single Pions in Nucleon-Nucleon and Pion-Nucleon Interactions"

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(Scientific Secretaries A. Mukhin, Yu. Prokoshkin, and L. Soroko (Dubna)). First, he gave a survey of new experimental data contributing towards explaining the problem of the charge-independence of pion- and nucleon processes, and further data concerning the search for the ϱ^0-meson, and details concerning new work relating to pion angular distribution. Investigations of single pion production in (nn)-collisions resulted in experimental agreement with the phenomenological theory of Mandel'shtam, which demands that π-n-resonance interactions occur in a state with isotopic spin $T = 3/2$. In the following lecture by Segrè, M. Shafranov and V. Shakhbazyan (Dubna) acted as scientific secretaries. Next, V. I. Veksler (Dubna) spoke about "Nucleon-Nucleon and Pion-Nucleon Interactions in the 1.5 - 10 Bev Range" (Scientific Secretaries: N. Bogachev, V. Grishin, and M. Podgoretskiy (Dubna)). He delivered a report on the investigations carried out in the past years in Dubna and made a comparison with theoretical results. Figure 1 shows the photograph supplied by him of the production and the decay of Λ^0 and anti-Λ^0-

hyperons. Investigations of the (pp)-scattering cross section yielded new results indicating that the scattering amplitude in the optical model has not only an imaginary- but also a real part. New data were obtained at Dubna also for the total elastic and inelastic (pp)- and (πp)-scattering cross sections at 9 and 7 Bev, respectively. Investigations carried out by I. Ye. Tamm are mentioned. In the following, Ya. A. Smorodinskiy (Dubna) spoke about (nn)-scattering (Scientific Secretaries B. Golovin (Dubna) and L. Puzikov (Moscow)) and Chew (Secretaries: L. Lapidus (Dubna) and Yu. Novozhilov (Moscow)). At Dubna proton accelerations to 635 Mev are possible. At the following three surveys on electromagnetic interaction and nucleon structure A. Varfolomeyev and L. Solov'yev (Moscow) as well as S. Bilen'kiy and B. Barbashov (Dubna) acted as scientific secretaries. There followed a lecture delivered by Steinberger, whose scientific secretaries were E. Okonov and R. Rvndin (Dubna). The lecturer Alvarez was assisted by the secretaries A. Lyubimov and

N. Petukhova (deceased) (Dubna), and Salam by the secretaries B. Valuyev and V. Solov'yev (Dubna). A special session of the Conference dealt with the problem of dispersion relations. D. V. Shirkov (Dubna), spoke about the theory (secretaries: V. Vladimirov and A. Logunov); the second lecture dealing with this subject was delivered by Lehmann (secretaries: V. Favnberg and O. Parasyuk (Moscow)). A further special session dealt with theoretical single reports ("New Theoretical Ideas"). Among others, Landau spoke about diagram technique, Garibyan (Yerevan) on the radiation of relativistic particles in the passage through the boundary between two media. Two further lectures dealt with weak interaction problems: A. A. Alikhanov (Moscow) (experimentally) and R. Marchuk (theoretically); the scientific secretaries were B. Ioffe and V. Lyubimov, and L.Okun' and I. Shapiro(Moscow) respectively. At Dubna the muon precession in the magnetic field was investigated, and direct proof was supplied for the first time that muon spin is half-integral. The group of research scientists at Dubna further succeeded in proving the radiationless muon capture by heavy

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The Physics of Elementary Particles

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nuclei (nuclear excitation), as predicted by Zaretskiy (Moscow). During the following lecture delivered by Glaser, I. Kobzarev acted as scientific secretary and during that delivered by Powell, I. Gramenitskiy (Dubna), V. Maksimenko (Moscow), and V. Kharitonov (Yerevan). A survey on the theory of multiple production of particles in the case of ultra-high energies was finally delivered by Ye. L. Feynberg (Moscow), D. Chernavskiy (Moscow) and V. Barashenkov (Dubna) acting as his scientific secretaries. During the Conference the delegates paid a visit to the Institut fiziki AN USSR (Institute of Physics of the AS UkrSSR) at Kiyev, after which many foreign delegates visited Dubna. There are 4 figures.

Card 6/6

VAN SHU-FEN' [Wang Shu-fên]; DALKHAZHAV, N.; LEBEDEV, R.M.; STREL'TSOV, V.N.

Dependence of distortions and spurious scattering on the angle of track slopes in a nuclear emulsion. Prib. i tekh. eksp. 6 no.2:60-62 Mr-Ap '61. (MIRA 14:9)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Photography, Particle track)

L 10405-63 EPF(n)-2/EWT(m)/BDS--AFFTC/ASD/AFWL/SSD--Pu-4--ES
ACCESSION NR: AP3001188 S/0089/63/014/005/0502/0505

65
63

AUTHOR: Biryukov, V.; Lebedev, R.

TITLE: Thirteenth session of the Uchenyy Sovet Ob"yedinennogo instituta yadernykh issledovaniy (Scientific Council of the Joint Institute of Atomic Research) [Held at Dubna, November, 1962]

SOURCE: Atomnaya energiya, v. 14, no. 5, 1963, 502-505

TOPIC TAGS: conference

ABSTRACT: Academician V. I. Veksler reported on the work of the Laboratoriya vysokikh energiy (High-Energy Laboratory) and on the construction of large physical equipment, such as a large bubble chamber and pure beam channels. Prof. V. P. Dzhelepov described in detail the discovery of Pi-meson Beta decay and measurement of its probability and also reported on experimental investigations of mesoatomic and mesomolecular processes and of the capture of Mu mesons by He sup 3 nuclei. He indicated the importance of experimental and theoretical work performed by B. M. Pontecorvo in the field of weak

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L 10405-63
ACCESSION NR: AP3001188

interactions and neutrino physics. G. N. Flerov spoke on the synthesis of transuranium elements and the development of rapid methods for the separation of short-lived transuranium elements. During the session, a meeting of the Sektsiya soveta po fizike nizkikh energiy (Low-Energy-Physics Section) was held. It planned future conferences on reactor physics and reactor engineering, on spectroscopy of neutron-deficient isotopes and the theory of the nucleus, and on inelastic scattering of slow neutrons in crystals and liquids.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 000 OTHER: 000

ja/ee
Card 2/2

BIRYUKOV, V.; LEBEDEV, R.

Fourteenth Session of the Scientific Council of the United Institute of Nuclear Research. Atom. energ. 15 no.6:530-532 D '63. (MIRA 17:1)

L 6990-65 EWT(m) DIAAP/AFMD(t)/RAEM(t) DM S/0089/64/016/005/0459/0462
ACCESSION NR: AP4036537

AUTHOR: Biryukov, V.; Lebedev, R.

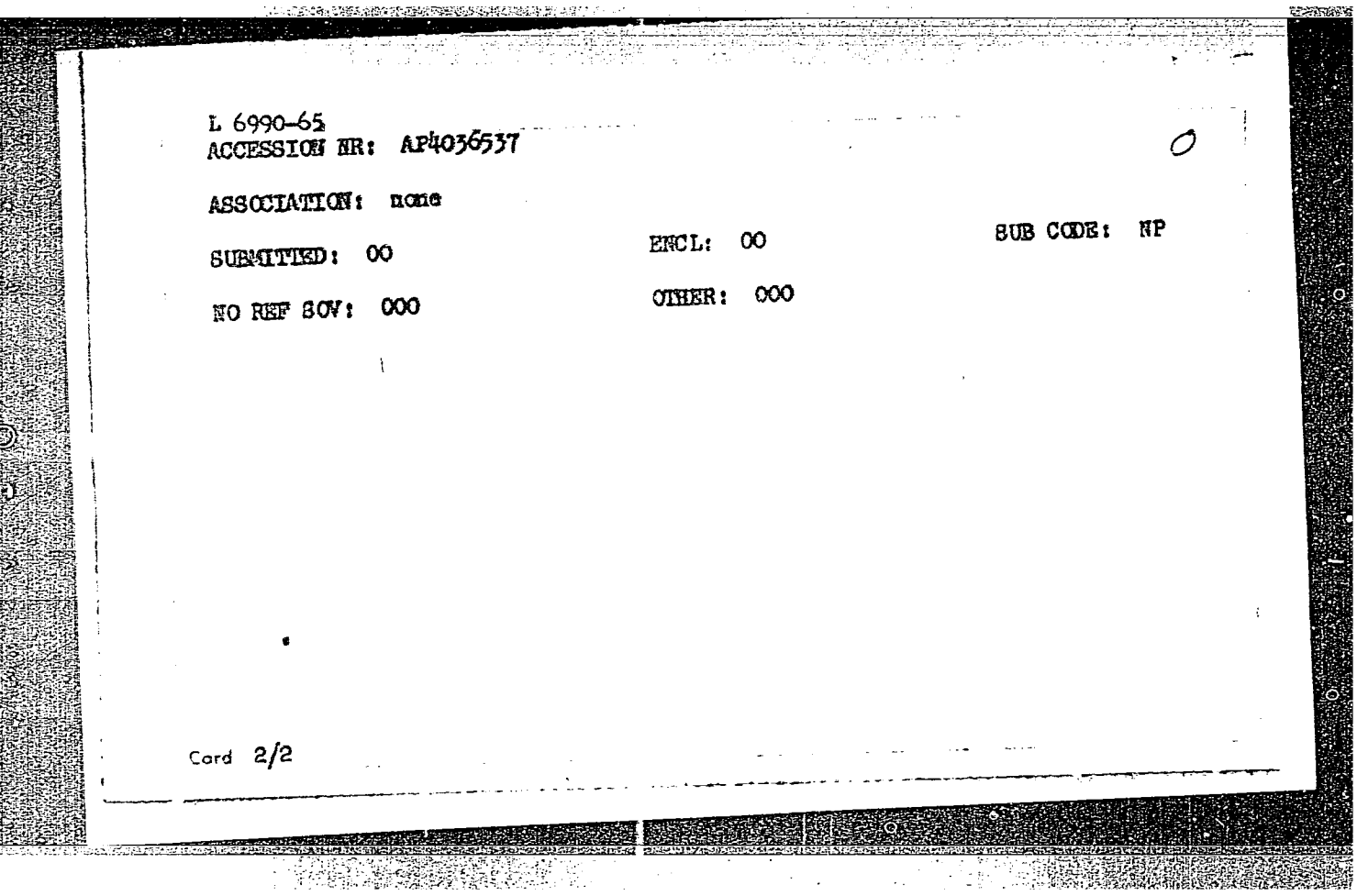
TITLE: 15th Session of the Scientific Council of the Joint Institute for Nuclear Research

SOURCE: Atomnaya energiya, v. 16, no. 5, 1964, 459-462

TOPIC TAGS: research, nuclear theory, nuclear science report, automatic data processing

ABSTRACT: The session took place in Dubna in January 1964. It was dedicated to the review of achievements in 1963. Corresponding Member AN SSSR D. I. Blokhintsev, director, reported that the scientific plans for 1963 have been essentially fulfilled. Particular attention was given to automatic processing of experimental data. The group leaders reported in detail on the experimental and theoretical work accomplished. It was pointed out that international scientific cooperation has grown, particularly with countries of the Soviet bloc. Orig. art. has: no figures.

Card 1/2



L 6990-65
ACCESSION NR: AP4036537

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: NP

NO REF SOV: 000 OTHER: 000

Card 2/2

SOV/51-6-2-5/39

AUTHOR: Lebedev, R.S.

TITLE: Calculation of Vibrational Spectra of Cyclopentane and Deuterocyclopentane Molecules (Raschet kolebatel'nykh spektrov molekul tsiklopentana i deyterotsiklopentana)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 154-161 (USSR)

ABSTRACT: Cyclopentane (C_5H_{10}) and its derivatives occur in crude oil. Consequently the spectrum of C_5H_{10} is of importance in spectrochemical analysis (Ref 1-6). Interpretation of the cyclopentane spectrum (Ref 7) cannot be relied on as yet; only the most probable relationships between frequencies and vibration modes were reported (Ref 8). The present paper described calculation of the vibrational frequencies of cyclopentane and deuterocyclopentane using a mechanical model shown in a figure on p 155. It was assumed that carbon atoms formed a regular pentagon with $\angle$ CCC = 108° and sides of 1.53 Å length. The C--H bond lengths were taken to be 1.09 Å and symmetrical with respect to the plane containing carbon atoms. Each pair of C--H bonds was assumed to lie in a plane which crosses the centre of the carbon pentagon. $\angle$ HCH = 109°28' was assumed to be tetrahedral. $\angle$ HCC = 109°50' was calculated geometrically. Thirty nine normal vibrations of cyclopentane

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were dealt with using 45 natural vibrational coordinates. The kinematic coefficient matrix elements were determined using Yel'yashevich's method (Ref 12) with a correction for the anharmonicity by means of "spectroscopic masses". The dynamic coefficient matrix was represented in the usual way (Ref 13). The force constants of other molecules were used (since they are not known for cyclopentane and deuterocyclopentane) and they were taken from the book by Vol'kenshteyn et.al. (Ref 12). The results of calculations of the frequencies and forms of normal vibrations are given in Table 1 (cyclopentane) and Table 2 (deuterocyclopentane). Simultaneously, using Mayants's method (Ref 15) derivatives of the frequencies with respect to the force constants were calculated. These derivatives are given elsewhere (Ref 14). Comparison of the calculated (column 5) and observed (Raman column 3, infrared column 4) frequencies in Tables 1 and 2 shows that the differences between them are greatest for frequencies corresponding to variations of the angles HCC. This may be due to the use of the force constants of other molecules in calculations of cyclopentane vibrations. Satisfactory results were obtained for α-frequencies. The calculations confirmed D_{5h} symmetry

 of cyclopentane and deuterocyclopentane. A complete analysis of C_5H_{10}

Calculation of Vibrational Spectra of Cyclopentane and Deuterocyclopentane Molecules

and C_5D_{10} spectra is not possible until the force fields of these molecules are known. Acknowledgments are made to L.S. Mayants for suggesting this work and L.M. Sverdlov for advice on it. There are 12 tables (2 of which are numbered), 1 figure and 19 references, 10 of which are Soviet, 5 English and 4 German.

SUBMITTED: February 10, 1958

SOV/51-6-3-8/28

AUTHOR: Lebedev, R.S.

TITLE: Calculation of the Vibrational Spectrum of the Methylcyclopentane Molecule (Raschet kolebatel'nogo spektra molekuly metiltsiklopentana)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 3, pp 329-333, (USSR)

ABSTRACT: Methylcyclopentane is a simple derivative of cyclopentane hydrocarbons. A large number of experimental investigations have dealt with this compound: Raman spectra have been reported by many workers (Refs.1-10), and also infrared spectra (Ref.11-16). There has been, however, no interpretation of these spectra. The present paper reports calculation of frequencies of normal vibrations of methylcyclopentane and uses the results obtained to interpret the Raman and infrared spectra. Natural vibration coordinates used are shown in a figure on p 329. The results of calculations are given in col.5 of a table on p 331. The calculated frequencies are compared with the empirical Raman (col.3) and infrared (col.4) values, and their interpretation is given in col.1. The calculations yielded a larger number

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Calculation of the Vibrational Spectrum of the Methylcyclopentane Molecule

of frequencies than those observed experimentally. However, there are infrared lines in the region 2800-2100 cm^{-1} which are observed experimentally but cannot be deduced by calculation. The author suggests that these lines are due to intermolecular interactions (Ref.23) or due to a combination of the fundamental frequencies or their harmonics. The calculations also failed to yield the Raman frequency at 227 cm^{-1}. This frequency is ascribed by the author to non-planar vibrations of the carbon ring. Acknowledgment is made to L.S. Mayants for his advice. There are 1 figure, 1 table and 23 references, of which 8 are Soviet, 7 English, 3 French, 4 German and 1 Indian.

SUBMITTED: March 10, 1958

SOV/51-7-2-4/34

AUTHORS: Lebedev, R.S. and Sechkarev, A.V.

TITLE: On the Problem of Force Constants of the Cyclopentane Molecule (K voprosu o silovykh postoyannykh molekuly tsiklopentana)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 2, pp 164-169 (USSR)

ABSTRACT: In an earlier communication (Ref 1) one of the authors (Lebedev) reported a complete calculation of the frequencies and forms of normal vibrations of cyclopentane and deuterocyclopentane using a mechanical model and force constants of similar molecules. The differences between the calculated and experimental frequencies were up to 200 cm-1. The present paper describes a calculation which gives force constants of the cyclopentane (C_5H_{10}) molecule more precisely; in this calculation it was assumed that C_5H_{10} has point symmetry of D_{5h} type. Non-zero dynamic coefficients were calculated using a variational method and successive approximations (Ref 4). In variation of these coefficients values of the derivatives of the force constants with respect to frequency were used. The identification of the frequencies was checked by comparison of the cyclopentane spectrum with that of deuterocyclopentane, using the Teller--Redlich rule. Table 2 lists the results of calculations and the experimental values of the vibrational (Raman and infrared)

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frequencies; the experimental data were taken from earlier work (Refs 7, 12-14). The calculated values of the force constants are listed in Table 3. The reported results show that the calculated frequencies of cyclopentane are often within the limits of scatter of the experimental values. In individual cases the differences between the calculated and empirical values reach 40-50 cm-1; this is considered to be a satisfactory agreement. The authors point out the presence of experimentally observed lines which are forbidden by selection rules (they are shown in italics in Table 2). Two such forbidden lines were observed by Landsberg et al. (Ref 7) in the Raman spectrum of cyclopentane; according to selection rules these two lines should be present only in the infrared absorption spectrum. The authors suggest that the observed "forbidden" lines are due to strong intermolecular interactions in solutions. There are 1 figure, 3 tables and 14 references, 9 of which are Soviet, 3 English, 1 German and 1 translation from English into Russian.

SUBMITTED: October 27, 1958

18.8200
18.1120

AUTHORS: Postnikov, V.S. and Lebedev, R. S. 66896 SOV/126-8-1-14/25

TITLE: Influence of Plastic Deformation on Internal Friction of Iron-Tungsten Alloys

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 1, pp 95-102 (USSR)

ABSTRACT: Although much work (Refs 4-46) has been done on the influence of work hardening on internal friction the nature of this effect remains, because of its complexity, far from clear. The present investigation aimed at elucidating the effect for binary alloys using the low-frequency torsional oscillation method described by A. Ya. Samoylova and V. S. Postnikov (Ref 46). The 300 mm long, 0.7 mm diameter, iron-tungsten (1.83 and 5% W) specimens based on armco iron were supplied by the Institut fiziki metallov i metallovedeniya (Metal Physics and Metallurgy Institute) of TsNIIChM. All measurements were effected at 10^{-3} mm Hg, specimens with 5, 15, 25, 30, 40, 60, 80 and 95% reduction being used. Internal friction as indicated by the logarithmic decrement divided by π, was measured with heating at about 3.5 degrees/min after previous annealing at 825°C for 4

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Influence of Plastic Deformation on Internal Friction of Iron-Tungsten Alloys

90 min. The isothermal change in internal friction at the same maximum oscillation amplitude was also determined. All 1.83% W specimens were tested 7 months and all 5% W specimens were tested 1 month after reduction. The results show that internal friction of the plastically deformed unannealed alloys is large (Figs 1,2) compared with that of the same alloys after high-temperature annealing (Figs 3,4) and depends largely on heating rate and soaking time (Fig 6). The less the reduction the more the internal-friction peak is displaced towards higher temperatures (Figs 1,2), the peak-height depending on reduction (Fig 5, curves 1 and 2). With isothermal soaking at various temperatures internal friction decreases exponentially with time (Fig 6). The activation-energy of the "relaxation" depends on the tungsten content and degree of previous plastic deformation, decreasing as the latter rises. At high temperatures (about 840°C) internal friction is at a higher level for deformed than for annealed specimens (curves 3 and 4 compared with curves 5 and 6 in Fig 5). The high-temperature internal-

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6686
SOV/126-8-1-14/25

Influence of Plastic Deformation on Internal Friction of Iron-Tungsten Alloys

friction level is directly related to the strength at the same temperature (Figs 3,4). At high temperatures the shear modulus is higher for un-annealed than annealed specimens, these being reversed at low-temperatures (Figs 1-5). The authors consider that these results, together with published data, confirm the view (Ref 3) that high-temperature internal friction is a good index of the high-temperature strength. There are 6 figures, 1 table and 50 references, 11 of which are Soviet, 28 English, 10 German and 1 French.

ASSOCIATION: Kemerovskiy gosudarstvennyy pedagogicheskiy institut (Kemerovo State Pedagogic Institute)

SUBMITTED: July 30, 1957 (Initially)
December 16, 1957 (After revision)

Card 3/3

SOV/126-8-2-23/26

AUTHORS: Lebedev, R.S. and Postnikov, V.S.

TITLE: Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 310 - 314 (USSR)

ABSTRACT: The authors describe a continuation of their work (Ref 1) on the influence of plastic deformation on internal friction of iron-base alloys. In the present work, they used their former method and conditions except for a higher heating rate (60 °C per minute); the error at high temperature has been reduced to about 1%. Results for electrolytic iron reduced by 8, 17, 30, 47, 70 and 92% and armco-iron + 4% Ni reduced by 20-80% are tabulated (for the Fe-Ni alloy) and shown in Figures 1-5. Some specimens were annealed at 825 °C for 1.5 hours. Figures 1-4 show internal friction and shear modulus as functions of temperature for different reductions. Figures 1 and 3 relate to iron and iron-nickel, respectively, without annealing; Figures 2 and 3, respectively.

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Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

with annealing. Internal-friction peak values are plotted against degree of reduction for the various tests in Figure 5. The internal-friction curve for iron-nickel has two maxima, while the iron-tungsten alloy (Ref 1) has only one. The first maximum disappears almost completely after high-temperature annealing but the second does not. The first is thus due mainly to previous deformation and, as confirmed by activation-energy values (table), is associated with recrystallization; the second maximum is associated with grain-boundary relaxation. The authors suggest that internal-friction values give some indication of high-temperature strength. As before (Ref 1), the activation energy of internal-friction recovery in isothermal soaking was found to be considerably less than that of diffusion or of recrystallization. Although this suggests that recovery is not diffusional, the authors consider that insufficient experimental data are available to discuss a dislocation mechanism (Refs 4-6).

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SOV/126-8-2-23/26

Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

There are 5 figures, 1 table and 6 references, of which 4 are Soviet, 1 English and 1 German.

ASSOCIATION: Kemerovskiy gosudarstvennyy pedagogicheskiy institut (Kemerovo State Pedagogical Institute)

SUBMITTED: March 6, 1959

Card 3/3

LEBEDEV, R. S.

PHASE I BOOK EXPLOITATION SOV/5305

Moscow. Institut stali

Relaksatsionnyye yavleniya v metallakh i splavakh; trudy Mezhvuzovskogo soveshchaniya (Relaxation Phenomena in Metals and Alloys; Transactions of the Inter-Institute Conference) Moscow, Metallurgizdat, 1960. 326 p.

Sponsoring Agency: Ministerstvo vysshego i srednego spetsial'nogo obrazovaniya RSFSR and Moskovskiy institut stali imeni I.V. Stalina.

Ed. (Title page): B.N. Finkel'shteyn; Ed. of Publishing House: Ye.I. Levit; Tech. Ed.: A.I. Karasev.

PURPOSE: This collection of articles is intended for personnel in scientific institutions and schools of higher education and for physical metallurgists and physicists specializing in metals. It may also be useful to students of these fields.

COVERAGE: The collection contains results of experimental and theoretical investigations carried out by schools of higher education and scientific research institutions in the field of the relaxation phenomena in metals and alloys. Several articles are devoted to the investigation—by the internal-friction method—of the decomposition of supersaturated solid solutions. Also analyzed are the defects of the crystalline lattice, plastic deformations, high-temperature behavior of alloys, and creep. Problems of the relation between internal friction and temper brittleness, the use of the method of internal friction in the investigation of powder-metallurgy products, and the mechanics of impact fatigue are discussed. The collection also contains articles on the damping characteristics of materials, elastic after-effect, and the new slow-detection method. No personalities are mentioned. References follow most articles. There are 366 references: 192 Soviet and 174 non-Soviet.

Tsobkallo, S.O. [Leningradskiy politekhnicheskiy institut (Leningrad Polytechnic Institute)]. Elastic Aftereffect of the Alloys Used for Springs 154

Pastov, N.S. [Institut metallovedeniya i fiziki metallov TsNIICһM (Institute of Science of Metals and Physics of Metals of the TsNIIChM)]. On the Theory of Elastic Aftereffect in Homogeneous Bodies 169

Garber, R.I., and T.T. Mogil'nikova [Fiziko-tekhnicheskiy institut AN UkrSSR (Physicotechnical Institute of the Academy of Sciences UkrSSR)]. Internal Friction and Plastic Deformation in Overstressed Microzones of Rigid Bodies 178

Grin', A.V., and V.A. Pavlov [Institute of Physics of Metals of the Academy of Sciences USSR]. Internal Friction in Deformed α-Solid Solutions of Aluminum With Magnesium 189

Lebedev, R.S., and V.S. Postnikov [Kemerovo Pedagogical Institute]. Effect of Plastic Deformation on Internal Friction of Ferrous Alloys 199

Tsobkallo, S.O. [Leningrad Polytechnic Institute]. Study of Defects in Metal Products and Samples by the Method of Measuring the Damping of Vibrations 222

Pavlov, V.A. [Institute of Physics of Metals of the Academy of Sciences USSR]. Analysis of the Defects in Crystal Lattice by Using the Internal Friction 227

Datsko, O.I., and V.A. Pavlov [Institute of Physics of Metals of the Academy of Sciences USSR]. Dependence of the Internal Friction in Pure Nickel on the Temperature 234

Borisova, N.S., and V.M. Rozenberg [Institute of Science of Metals and Physics of Metals, TsNIIChM]. Study of the Effect of the Intergranular Structure of Austenite on the Internal Friction and Creep 241

Samoylova, A.Ya., and V.S. Postnikov [Kemerovo Pedagogical Institute] Recovery of the Internal Friction in Aluminum, Silver, and Platinum After the Removal of the Loading 251

Postnikov, V.S. [Kemerovo Pedagogical Institute]. Internal Friction of Plastically Deformed Metals and Alloys at Elevated Temperatures 264

Bernshteyn, M.L., and Ye.S. Tikhomirova [Moscow Steel Institute]. Effect of Surface-Hardening on the Internal Friction of Commercial-Grade Iron 279

Maksimyuk, P.A. [Kiyevskiy gosudarstvennyy universitet (Kiyev State University)]. Analysis of the Maximum Internal Friction on Grain Boundaries in the Aluminum-Copper-Nickel Alloys 289

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24587 S/137/61/000/005/041/060
A006/A106

18 8200

AUTHORS: Lebedev, R. S.; Postnikov, V. S.

TITLE: The effect of plastic deformation on internal friction of iron-base alloys

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 5, 1961, 32, abstract 5Zh243 (V sb. "Relaksats. yavleniya v metallakh i splavakh", Moscow, Metallurgizdat, 1960, 199-221)

TEXT: The low-frequency method of low-amplitude twisting oscillations was used to investigate the effect of case-hardness on internal friction of electrolytic Fe and Fe-W, Fe-Si, Fe-Ni and Fe-Ti alloys. The measurements were made in a vacuum ($\sim 10^{-3}$ mm Hg) on 300 mm long specimens of 0.7 mm in diameter at 1 cycle oscillation frequency. All the specimens were annealed in a vacuum at 825°C for 90 minutes. It was established that internal friction of plastically deformed non-annealed alloys was high in comparison to that of the same alloys which were preliminary annealed, and that it strongly depended on the heating rate and the holding time. On the temperature curve of internal friction a peak of internal friction was observed which was shifted to the side of low temperatures with an

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The effect of plastic deformation ... 24587 S/137/61/000/005/041/060
A006/A106

increasing degree of compression. During isothermal holding at various temperatures internal friction decreases with time. It is noted that the modulus of shift at high temperatures for non-annealed specimens is greater than for annealed ones and is lesser at low temperatures. For Fe-Ni and Fe-Ti alloys two maxima were found on the temperature dependence curves of internal friction. There are 50 references.

[Abstracter's note: Complete translation] P. Z.

Card 2/2

24.3420

27744
S/058/61/000/007/026/086
A001/A101

AUTHORS: Lebedev, R.S., Sechkarev, A.V.

TITLE: Spectroscopic investigation of cyclopentane in different phase states

PERIODICAL: Referativnyy zhurnal. Fizika, no. 7, 1961, 144, abstract 7V334 ("Dokl. Mezhvuz. nauchn. konferentsii po spektroskopii i spektr. analizu". Tomsk, Tomskiy un-t, 1960, 108 - 109)

TEXT: The authors developed the methods of obtaining Raman spectra of liquid and crystalline substances in the range of low temperatures, including the liquid nitrogen temperature. The method was tested on cyclopentane. A comparative investigation was conducted of the vibrational spectrum of liquid cyclopentane within the wide temperature range (including the supercooled liquid) and the spectrum of crystalline state. In various regions of the cyclopentane vibrational spectrum some essential changes were noticed: emergence of a structure in the contour of some lines, arising of new frequencies, etc. The noted

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Spectroscopic investigation ...

peculiarities are caused, in the authors' opinion, by deviation of the molecule structure from D_{5h} symmetry with temperature lowering which, apparently, can be ascribed to change in the nature of intermolecular interaction.

M. Averbukh

[Abstracter's note: Complete translation]

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Card 2/2

LEBEDEV, R.S.; SECHKAREV, A.V.

Study of Raman spectra at low temperatures. Izv.vys.ucheb.zav.; fiz. no.3:62-65 '61. (MIRA 14:8)

1. Kemerovskiy gornyy institut i Kemerovskiy pedagogicheskiy institut.

(Microspectrophotometry) (Raman effect)

LEBEDEV, R.S.

Calculating the vibration spectrum of ethylcyclopentane and H-propylcyclopentane molecules. Izv. vys. ucheb. zav.; fiz. no.6:79-85 '63.
(MIRA 17:2)

1. Kemerovskiy gosudarstvennyy pedagogicheskiy institut.

S/048/63/027/001/023/043
B108/B186

AUTHORS: Sechkarev, A. V., and Lebedev, R. S.

TITLE: Effect of the temperature conditions on some parameters of the vibrational spectra of naphthenes

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 1, 1963, 65-68

TEXT: Considerable changes with temperature in the vibrational spectrum of cyclopentane were observed by Lebedev and Sechkarev (Collection Fizicheskiye problemy spektroskopii (Physical problems in spectroscopy), p. 386, M.-L., 1962). The authors of that paper studied the temperature dependence of the Raman spectra of cyclopentane, methyl cyclopentane, cyclohexane, and methyl cyclohexane using an ИСП-51 (ISP-51) spectrograph. The method is described in Izv. VUZov. Fizika, 3, 63 (1961). A considerable Rayleigh scattering, also at low temperatures (down to below the point of crystallization) was observed. The change in the spectra of the five-membered naphthenes, in particular the increase in intensity of some forbidden lines at low temperatures, indicate a reduction in symmetry of

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the molecules on cooling. This is attributed to the interaction between the molecules. The six-membered naphthenes hardly showed any change in their spectra. This shows that the molecules are not very sensitive to temperature changes, and that their carbon rings conserve their D_{3d} symmetry. The fundamental lines in the vibrational spectra of the naphthenes were found to be the least sensitive to temperature changes. There are 1 figure and 1 table.

ASSOCIATION: Kemerovskiy gornyy institut (Kemerovo Mining Institute)

L 42720-65 EWT(m)/EPF(c)/EWP(j) Pc-4/Pr-4 RM

ACCESSION NR: AR5008412 UR/0058/65/000/001/D008/D008

SOURCE: Ref. zh. Fizika, Abs. 1D54

AUTHOR: Lebedev, R. S.

TITLE: Calculation of the vibrational spectrum of mono-substitutes of the cyclopentane series

CITED SOURCE: Uch. zap. Kemerovsk. gos. ped. in-t, vyp. 7, 1963, 51-60

TOPIC TAGS: cyclopentane series, vibrational spectrum, substitution radical

TRANSLATION: The author calculated the frequencies of the normal oscillations of ethylcyclopentane and n-propylcyclopentane, which are compared with the frequencies experimentally observed in the spectrum of these substances. An anlysis of the calculations shows that the complication introduced into the structure of the cyclopentane molecule by increasing the length of the substituting radical leads to the appearance of frequencies corresponding to the radical. On the whole, the spectrum can be represented as a superposition of the vibration frequencies of the ring AND OF THE RADICAL, AND THEIR INTERACTION.

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L 46368-65 EWT(m)/EPF(c)/EWP(j) Pc-4/Pr-4 RM

ACCESSION NR: AR5012255 UR/0058/65/000/003/D034/D034

SOURCE: Ref. zh. Fizika, Abs. 3D248

AUTHOR: Lebedev, R. S.; Sechkarev, A.V.

TITLE: Raman spectrum of cyclopentane, cyclohexane, and their methyl derivatives

CITED SOURCE: Uch. zap. Kemerovsk. gos. ped. in-t, vyp. 7, 1963, 61-72

TOPIC TAGS: cyclopentane, cyclohexane, methyl derivative, Raman spectrum

TRANSLATION: The spectra were plotted with an ISP-51 spectrograph, and the sources were PRK-2 and low-pressure lamps. In cyclopentane there were observed in the 1600-1800 region lines derived from the exciting 4047 Å line, and the missing from earlier investigations, as well as bands with structure 3500-4100 and 4200-4360 cm^{-1}. In methylcycloheptane, in the region 1460-2700 cm^{-1} there was observed a set of rather intense lines, as well as a band with structure 3260-4360 cm^{-1} beyond the C-H frequencies. Seventeen frequencies were obtained in cyclohexane in the region of 802-1466 cm^{-1}. Bibliography, 38 titles. A. Bartkevich

SUB CODE: OC, OP ENCL: 00

Card 1/1 pm

L 49767-65 EPF(c)/EWP(j)/EWT(m) Pc-4/Pr-4 RM
ACCESSION NR: AR5012254 UR/0058/65/000/003/D033/D033

SOURCE: Ref. zh. Fizika, Abs. 3D241

AUTHORS: Lebedev, R. S.; Sechkarev, A. V. 31 B

TITLE: Experimental and theoretical study of vibrational spectra of methyl and ethyl cyclopentane

CITED SOURCE: Tr. Komis. po spektroskopii. AN SSSR, vyp. 1, 1964, 361-369

TOPIC TAGS: vibrational spectrum, methyl cyclopentane, ethyl cyclopentane, Raman spectrum, infrared absorption, microscopic analysis

TRANSLATION: An experimental study was made of the Raman and infrared absorption spectra of monosubstituted cyclopentane using a low-temperature research procedure. The calculations of the normal vibrations of the molecules have been carried out. An interpretation is proposed for the spectra, and some of their features are discussed, in particular the influence of the approximate symmetry of the ring of molecules. The question of the accessible volume of a sample for the registration of the Raman spectrum from microscopic amounts of matter is discussed.

SUB CODE: GP, OC
Card 1/1

ENCL: 00

SECHKAREV, A.V.; LEBEDEV, B.S.; [illegible]TROV, A.K.

Vibrational spectrum of ethylcyclopentane. Izv. vys. ucheb. zav.; fiz. no.4:94-100 '64. (MIRA 17:8)

1. Kemerovskiy gornyy institut.

SECHKAREV, A.V.; LEBEDEV, R.S.

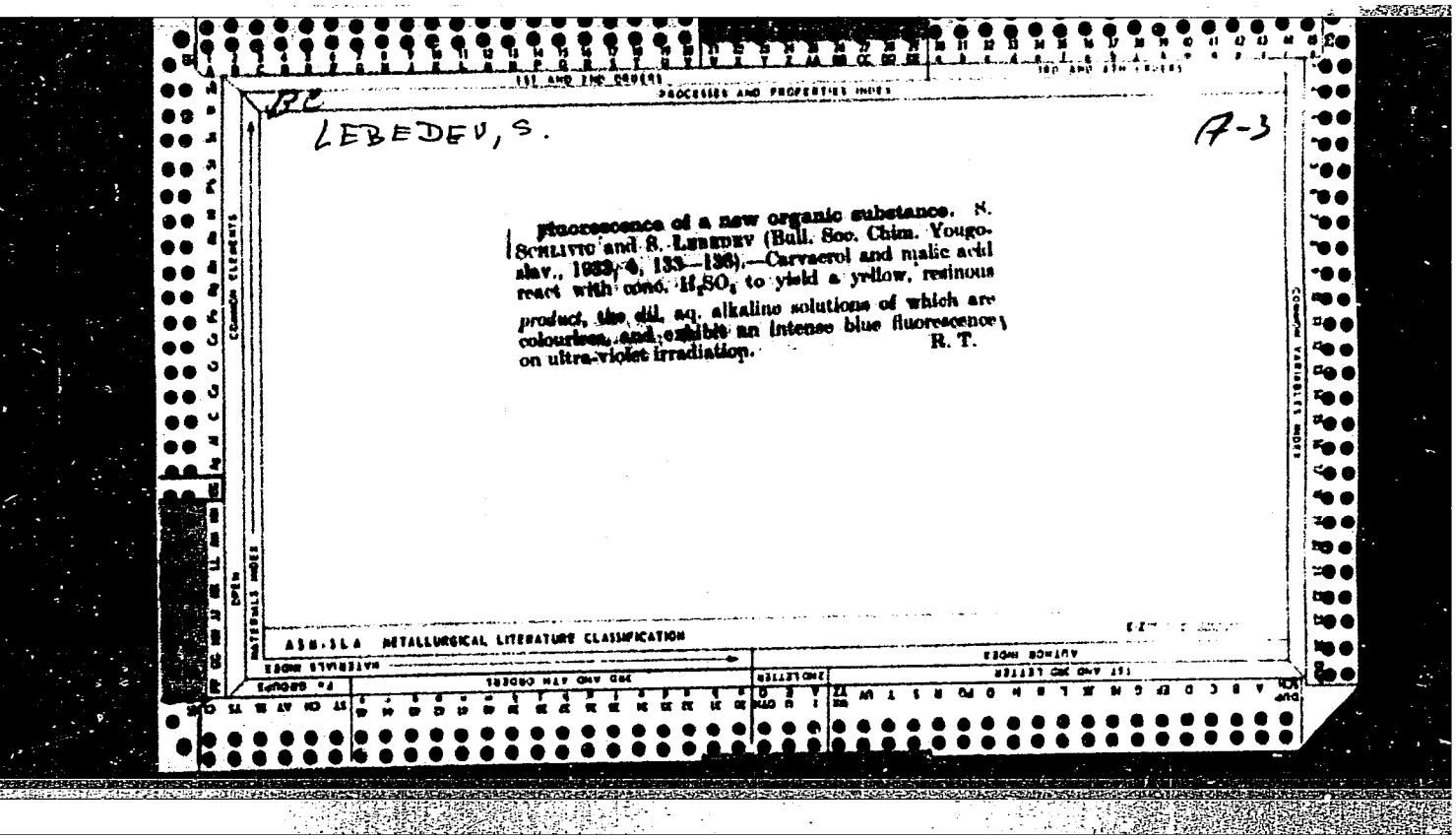
Characteristic sign of some hydrocarbons in their Raman spectra. Zhur. fiz. khim. 38 no.5:1343-1344 My '64. (MIRA 18:12)

1. Kemerovskiy gornyy institut. Submitted Aug. 3, 1963.

LEBEDEV, S. Geroy Sotsialisticheskogo Truda.

Our frontier in the seven-year plan. Sov. profsoiuzy 7 no.14:10-11 Jl '59. (MIRA 12:10)

1. Master martenovskogo tsekha Kirovskogo zavoda, Leningrad.
(Leningrad--Steel industry)



LEBEDEV, S.

A-3

Fluorescence of a new organic substance. S. SCHLITT and S. LEBEDEV (Bull. Soc. Chim. Yougoslav., 1932, 3, 133—136).—Carvacrol and malic acid react with conc. H_2SO_4 to yield a yellow, resinous product, the dil. aq. alkaline solutions of which are colourless, and exhibit an intense blue fluorescence on ultra-violet irradiation. R. T.

LEBEDEV, S.

"A View of the Origin of Hydrosiliciferous Nickel Ores in Takovo" p. 269
(ZBORNIK RADOVA, Vol. 22, no. 4, 1952, Beograd, Yugoslavia)

SO: Monthly List of East European Accessions, Library of Congress, Vol. 2, No. 10, October, 1953, Unclassified

LEBEDEV, S.

USSR

The role of the ionization product of water in the explanation of the metamorphic processes of hydrothermal and pneumatolytic phases. S. Lebedev. *Zbornik radova geol. inst. "Jovan Žujović"* No. 7, 239-58(1954)(German summary).—A discussion of hydrolytic reactions and solubilities at high temps. Michael Fleischer

LEBEDEV, S.

A fluorescence method for detection of nickel. S. Lebedev and M. Dermanović. *Zbornik radova geol. inst. "Jovan Zhujović"* 9, 161-2(in German, 162)(1957).—$CaCO_3$ pptd. from dil. Ni-bearing solns. gives a greenish yellow fluorescence with unfiltered ultraviolet light. Michael Fleischer

Distr: 4E2c/4E3d

LEBEDEV, S., kand. yurid. nauk, dotsent

Aggravation of controversies in the merchant marine of imperialistic countries. Mor. flot 25 no.4:44 Ap '65.
(MIRA 18:6)

1. Moskovskiy gosudarstvennyy institut mezhdunarodnykh otnosheniy Ministerstva inostrannykh del SSSR.

MAKSIMOVIC, Z.; LEBEDEV, S.; NIKOLIC, Vera

A contribution to the geochemical study of Avala Mountain near Belgrade: a hydromorphic anomaly in the Precica stream and its origin. Bul sc nat SANU 33 no.10:43-50 '64.

1. Department of Mineralogy and Petrology, University of Belgrade. Presented by Prof. Stojan Pavlovic and Prof. Pavle Savic.

BLAGOVESHCHENSKIY, Viktor Vasil'yevich, kand. sel'khoz. nauk;
LEBEDEV, S., red.; SALAKHUTDINOVA, A., tekhn. red.

[Increase the productivity of farm animals] Povysit' produktivnost' sel'skokhoziaistvennykh zhivotnykh. Tashkent, Gosizdat UzSSR, 1962. 42 p. (MIRA 16:5)
(Uzbekistan--Stock and stockbreeding)

GRANITOV, Ippolit Ivanovich, doktor biol. nauk; GRANITOV, Aleksandr Ivanovich; LEBEDEV, S., red.; ABBASOV, T., tekhn. red.

[Natural forage lands in Uzbekistan] Estestvennye kormovye ugod'ia Uzbekistana. Tashkent, Gosizdat UzSSR, 1962. 41 p. (MIRA 16:6)

(Uzbekistan--Pastures and meadows)

GORBUNOV, Vladimir Pavlovich; PAVLOVA, Anna Mikhaylovna; GLUSHENKOVA, Nina Ivanovna; LEBEDEV, S., red.; ABBASOV, T., tekhn. red.

[For two crops a year] Za dva urozhaia v god. Tashkent, Gos-izdat UzSSR, 1963. 38 p. (MIRA 16:5)
(Uzbekistan--Feeds)

LEBEDEV, S. A., Engr. and. Tech. Sci.

Dissertation: "Degree of Oil Purification with Filters of Tractor Engines." Sci Res Automobile and Automotive Inst (NAMI), 25 Jun 47.

SO: Vechernyaya Moskva, Jun, 1947 (Project #17836)

ADAMOVICH,A.V., kandidat tekhnicheskikh nauk; GRIGOR'YEV,M.A.; LEBEDEV,S.A. kandidat tekhnicheskikh nauk

Centrifugal filters for cleaning oil in automobiles. Avt. i trakt. prom. no.8:3-9 Ag'55. (MIRA 8:11)

1. Nauchno-issledovatel'skiy avtomotornyy institut
(Automobiles--Engines--Oil filters)

LEBEDEV, Serafim Aleksandrovich; ABDULIN, Fuat Salikh'yanovich; LYUSHIN, Sergey Fedorovich; KOVALEVA, A.A., vedushchiy redaktor; POLOSINA, A.S., tekhnicheskiy redaktor

[Studies of pressure wells] Issledovanie nagnetatel'nykh skvazhin. Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry, 1956. 56 p. (MLRA 10:5)
(Oil field flooding)

LEBEDEV, S.A.

25

PHASE I BOOK EXPLOITATION SOV/5494

Vasil'yev, Mikhail Vasil'yevich, and Sergey Zakharovich Gushchev

Reportazh iz XXI veka; my zapisali rasskazy dvadtsati devyati sovetskikh uchenykh o nauke i tekhnike budushchego (Reports From the Twenty-First Century; Stories of Twenty-Nine Soviet Scientists on Science and Engineering of the Future) [Moscow] Izd-vo Sovetskaya Rossiya, 1958. 243 p. 50,000 copies printed.

Ed.: V. A. Golubkova; Tech. Ed.: G. I. Kleyeva.

PURPOSE : This book is intended for the general reader.

COVERAGE: The book contains 27 articles (told reporters by Soviet scientists) dealing with probable future progress in physics, chemistry, electricity, metallurgy, engineering, mining, medicine, biology, agriculture, zoology, transportation, exploration of space, and photography. Attention is given to automation, automatic underground gasification of coal, use of new metals, modernization of oil fields, atomic electric stations, production of metal parts by the process of explosion, explosions

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Reports From the Twenty-First (Cont.) SOV/5494

in dam construction, cancer, internal longevity reserves, machine diagnoses of illnesses, surgery vs. treatment by ultrasonic vibrations, mechanical heart substitutes, human body banks, "medical engineering," enriched fodder, "superfertilizers", artificial snowfalls, agriculture vs. "mariculture", radiochemistry, power beam vs. wire, machines doing intellectual work, "HF automobiles" (with "radio motors"), "artificial sun" (electromagnetic rays focused above a city which cause heated molecules to shine), future ocean ships, "railway dreadnoughts", Moscow of the future, moving pavements, wheelless and driverless automobiles, electric cameras, the industrialization of Siberia, use of underground heat, climate control, living on the moon, antimatter, and photon jet. Names of the interviewed scientists are given. There are no references.

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Reports From the Twenty-First (Cont.) SOV/5494

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THE AGE OF RADIO

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Man Will Kindle an Artificial Sun [G. I. Babat, Professor] 135

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LEBEDEV, S.A.

PHASE I BOOK EXPLOITATION SOV/5055

Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh. 3d, 1958.

Gidrodinamicheskaya teoriya smazki. Opory skol'zheniya. Smazka i smazochnyye materialy (Hydrodynamic Theory of Lubrication. Slip Bearings. Lubrication and Lubricant Materials) Moscow, Izd-vo AN SSSR, 1959. 422 p. Errata slip inserted. 3,300 copies printed. (Series: Its: Trudy, v. 3)

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya.

Resp. Eds. for the Section "Hydrodynamic Theory of Lubrication and Slip Bearings": Ye. M. Gutyar, Professor, Doctor of Technical Sciences, and A. K. D'yachkov, Professor, Doctor of Technical Sciences; Resp. Ed. for the Section "Lubrication and Lubricant Materials": O. V. Vinogradov, Professor, Doctor of Chemical Sciences; Ed. of Publishing House: M. Ya. Klebanov; Tech. Ed.: O. M. Gus'kova.

PURPOSE: This collection of articles is intended for practicing engineers and research scientists.

COVERAGE: The collection, published by the Institut mashinovedeniya AN SSSR (Institute of Science of Machines, Academy of Sciences USSR) contains papers presented at the III Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh (Third All-Union Conference on Friction and Wear in Machines) which was held April 9-15, 1958. Problems discussed and [illegible] Hydrodynamic Theory (Cont.) SOV/5055

Use of Lubricant Materials

Kolesnikov, A. I. Special Features of the Behavior of Plastic Lubricants in Roller Bearings 291

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Lebedev, S. A. (deceased), and M. A. Grigor'yev. Wear of Components With Various Methods of Cleaning the Oil in the Lubrication System of an Automobile Engine 313

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[illegible]

RAMAYYA, K.S., doktor tekhn.nauk; LEBEDEV, S.A. , kand.tekhn.nauk;
ZAVEL'SKIY, V.S.; GRIGOR'YEV, M.A.

Effect of oil impurity on the wear of engines. Avt.prom. no.1:
8-11 Ja '59. (MIRA 12:1)

1. Gosudarstvennyy soyuznyy ordena Trudovogo Krasnogo Znameni
nauchno-issledovatel'skiy avtomobil'nyy i avtomotornyy institut.
(Automobiles--Lubrication)

BERZON, O.F.; LEBEDEV, S.A., red.; YEFREMOV, S.A., red.; PETROVA, V.V., red. izd-va; KASIMOV, D.Ya., tekhn. red.

[Price list for the construction of housing and buildings serving cultural and public needs in cities and territorial regions of the R.S.F.S.R.]Preiskurantnye tseny na zhilishchnoe i kul'turno-bytovoe stroitel'stvo po gorodam i territorial'nym raionam RSFSR. Moskva, Gosstroiizdat, 1962. 212 p. (MIRA 16:3)

1. Russia (1917- R.S.F.S.R.)Gosudarstvennyy komitet po delam stroitel'stva.
(Construction industry--Prices)

LEBEDEV, S.A., inzh.; LISINA, V.P., inzh.

Network for the acid washing of a feed-water economizer.
Energetik 9 no.2:7-8 F '61. (MIRA 16:7)

(Boilers) (Feed water)

LEBEDEV, S.A.; PRYAZHEVSKIY, V.A.; YAKHIN, S.G.

Determining the place of the formation of the stable oil emulsion in production wells. Nefteprom. delo no.3:30-32 '63. (MIRA 16:9)

1. Ufimskiy neftyanoy nauchno-issledovatel'skiy institut.

SOV/24-58-7-8/36

AUTHORS: Lebedev, S. A., Usenko, V. F., Shvidler, M. I. (Ufa)

TITLE: On Filtering a Flow in Transition from a Single Phase into a 2-Phase State (O fil'tratsii potoka, perekhodyashchego iz odnofaznogo sostoyaniya v dvukhfaznoye)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 7, pp 56-60 (USSR)

ABSTRACT: The question of the parameters of a flow of the vapourising liquid affected by the permeability of the saturated porous space was investigated by the authors. The following problems they describe in detail. A harmonic function p (pressure) confined in the space G (Fig 1) with higher pressure than the saturated one, has a finite number of logarithmic properties with its value becoming p_r at the boundary Γ''. At the boundary of the vapourising layer, the position of which in the space G is not known, the function $p = p'$ (saturated pressure). The operational pressure is applied to the wells situated in G. The profile γ_i represents a boundary of a vapourising zone g_i, which contains a harmonic function H_i, top of p 57 (S. A. Khristianovich function, Ref 1), where K_{zh}^{n} - specific phase permeability for liquids.

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On Filtering a Flow in Transition from a Single Phase into a 2-Phase State

In the space g_i the function H_i has a finite number of logarithmic properties conforming to the conditions $H_i = H'$ at the zone boundary, $H_i = H_{oi}$ for wells inside the zone, $H' = H(p') = \text{const} \neq p'$ (0 denotes the well). The rate of filtration of the liquid at the boundary γ_i is:

$$\frac{\partial H_i}{\partial n} = \frac{\partial p}{\partial n}$$

(n - normal to γ_i). The function H_i^* continuously increases the flow of liquid defined by the function p in g_i (Eqs 1.1 and 1.2). If the function $p^* = p$ in G and $p^* = H_i^*$ in g_i, then p^* becomes a harmonic function in F, i.e. in all the layers. For the wells situated in G, the function

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$p^* = p = p_o$ (Eq 1.3). The pressure p^* for the wells in g_i is:

$$p^* = H_{oi} - (H' - p') \quad . \qquad (1.4)$$

Thus the production of the mixed flow can be determined from a fictitious flow of a uniform and non-compressed liquid and the calculation performed with an application of the usual interconnection formula (Ref 7). Thus the functions p_1^* and p_2^* (Eq 1.5) in the space F are found when the pressures are taken as $p_1^* = p_o$, $p_2^* = 0$ for the wells in G , while $p_1^* = p'$, $p_2^* = H_{oi} - H'$ for these in g_i and $p_1^* = p_\Gamma$, $p_2^* = 0$ at the boundary Γ . If the harmonic function $p^{**}_2 = p_2^* + H'$, the function $p^{**}_2 = H$ for the wells in G , $p^{**}_2 = H_{oi}$ for these in G_i and $p^{**}_2 = H'$ at the profile Γ .

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On Filtering a Flow in Transition from a Single Phase into a 2-Phase State

Therefore, the flow defined by the functions p_1^* and p^{**}_2 has a production equal to that of all the wells. The value $H = H(p)$ is determined from Eqs (2.1) to (2.5). (Figs 2 and 3 show the indicating curves for $Q = Q(p_0)$ and $p_0 = p_0(Q)$, pr p' respectively). As an example the following data are given: $\Gamma = 28.8\ m^3/m^3$, $\mu_\Gamma = 0.02$ cps, $\mu_{in} = 2.35$ cps, $\xi = 0.246$, $\alpha = s\mu_\Gamma/\mu_{in} = \alpha = 0.00256$ for $s = 0.301 \frac{m^3}{m^3 atm}$ (s - coefficient of gas solubility). The relationship of ΔH^* and Δp^* for the well Nr 840 is given in

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On Filtering a Flow in Transition from a Single Phase into a 2-Phase State

Fig 4 with the lower curve from Ref 6. Fig 5 illustrates an interconnection of a system of two chains of wells. The calculation of the interconnection of wells is carried out with the following data: H_1 = 250 m, H_2 = 750 m, L = 1750 m, $2\sigma_1 = 2\sigma_2$ = 400 m, x_2 = 0, x_1 = 200 m, p_k = 170 atm, p_{o1}=80 atm, p_{o2} = 70 atm, p^c = 96 atm, k = 0.5 darcy, μ = 2.35 cps, r_{o1} = = r_{o2} = 0.1 m, h = 10 m. The values of $H^c - H_{o1}$ = 13.4 atm and $H^c = H_{o2}$ = 18.0 atm are based on Fig 2. The production of the wells is obtained as q_1 = 100.7 m^3 per day, q_2 = = 391.0 m^3 per day, for which the radii are r_1 = 5.35 m, r_2 = 4.47 m respectively. An analogical calculation based on the tables produced by K. A. Tsarevich gave: p_{o1} = 80 atm, p_{o2} = 70 atm, q_1 = 119.7 m^3 per day, q_2 = 448.4 m^3 per day. A vapourising zone consisted of one area, the dimensions of which are shown in Fig 6. In the case where the interference

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of the wells is affected by water pressure, the formula (3.1) (Ref 8) should be applied. There are 6 figures and 8 references, all of which are Soviet.

ASSOCIATION: Ufimskiy neftyanoy naucho-issledovatel'skiy institut (Ufa Oil Research Institute)

SUBMITTED: April 26, 1957.

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LEBEDEV, S.A.; BABALYAN, G.A.

Features of lift operation in Devonian flowing wells in the Tuymazy field. Izv. vys. uchob. zav.; neft' i gaz 7 no.2:35-40 '64.
(MIRA 17:10)

1. Bashkirskiy gosudarstvennyy universitet i Ufimskiy neftyanoy nauchno-issledovatel'skiy institut.

ZOLOYEV, M.T.; LEBEDEV, S.A.; USENKO, V.F.

Study of oil wells when bottom pressure is below the saturation pressure. Trudy VNII no.25:80-114 '59. (MIRA 15:4)

1. Ufimskiy neftyanoy nauchno-issledovatel'skiy institut.
(Oil reservoir engineering)

LEBEDEV, Sergey Alekseyevich and ZHDANOV, P. S.

"The Stability of Electrical Systems Working in Parallel," 2nd edition, Moscow-Leningrad, 1934

LEBEDEV, S. A.

At the plenary meeting of the conference of the Power Establishments of the Academies of Sciences of the Union Republics and of the Affiliates of the Academy of Science, USSR, the following paper was presented by Acting Member of the Academy of Science, Ukrainian SSR, S. A. Lebedev on "The problems of automatic regulation of synchronous machinery".

SO: Elektrichestvo, No. 9 Moscow, Sept. 1947 (U-5534)

LEBEDEV, S. A.

"The Artificial Stability of Synchronous Machines," report to the 12th Session of the International Conference on Large Electric Systems, Paris, 24 Jun-3 Jul 1948, Moscow, 1948

LEBEDEV, S. A.,

"BESM" Part I. Publ. House of the Acad. Sci. USSR, 1952

"BESM", Part II, Publishing House of the Acad. Sci. USSR, 1952

LEBEDEV, S. A.

Engineers

In memory of V. M. Khrushchov, Elektrichestvo
no. 1, 1952
Direktor Instituta Elektrotekhniki Akademii Nauk USSR,
Deystvitel'nyy Chlen An USSR

SO: Monthly List of Russian Accessions, Library of Congress, April 1952 1953, Uncl.

LEBEDEV, S. A. Academician

"Electronic Computer," Pravda, page 3, 4 Dec 55

Translation Current Digets of the Soviet Press, Vol.7, No.49, page 32, 18 Jan 56

LEBEDEV, S. A.

"High-Speed Electronic Computer of the Academy of Sciences of the USSR," 1955

Photostat copy available in Library

LEBEDEV, Sergey A. Acad.

"Certain Works in the Sphere of Computing Techniques," a paper read at the Fourth International Instruemnts and Measurements Conference, 15-23 Sep 56, Stockholm.

B-101950, 23 Nov 56

LEBEDEV, S. A.

Call Nr: QA76.L4 1956 a

AUTHOR: Lebedev, S.A.

TITLE: Electronic Calculating Machines (Elektronnyye vychislitel'-nyye mashiny)

PUB. DATA: Izdatel'stvo AN SSSR, Moscow, 1956, 20 pp., 3,300 copies.

ORIG.AGENCY: Akademiya Nauk SSSR. Sessiya po nauchnym problemam avtomatizatsii proizvodstva. Plenarnoye zasedaniye

EDITOR: None given.

PURPOSE: To present the contents of a paper read before the Soviet Academy of Sciences at the session on scientific problems relevant to the automation of production processes.

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Call Nr: QA76.L4 1956 a

Electronic Calculating Machines (Cont.)

COVERAGE: This monograph is a short review of recent progress in digital computer and calculating machine design, and a report on the state of theory and practice in the field as of 1956. Germanium diodes have proven entirely reliable in operation. Of ten thousand diodes installed in high-speed electronic computers (БЭСМ), only a few broke down in the course of two years of operation. The production of germanium diodes, however, still does not meet the demand (p.3). The indium plated diode with the gold plated filament has been developed but has not found wide application. This type of diode has lower forward resistance and a high ratio of reverse to forward resistance which makes it possible to improve the characteristics of the electronic circuit. In this respect, silicon diodes have even better characteristics. Computers built around point-contact semi-conductor triode circuits have

Card 2/6

Electronic Calculating Machines (Cont.)

already been developed in a number of institutes of the Academy of Sciences and of industry. However, real progress in developing transistorized circuits can be realized only by the application of the high-frequency junction transistor of the "pnp" type. The mass production of these types of transistors is of the first importance to the development of computer technique (p.4). Difficulties are being encountered in the development of ferrite memory cores especially in combination with semiconductors and industry has not yet mastered the problem of their mass production. This will require the sustained and joint efforts of chemists, metallurgists and technologists(p.4). Studies are being made at the present time (1956) on the utilization in electronic computers of seignetto-

Card 3/6

Electronic Calculating Machines (Cont.)

electric core memory cells with a rectangular hysteresis loop. They require less power for control and in this are superior to the ferrite core. The development of these very promising elements, being conducted in part at the institutes of physics of the Academy of Sciences, is proceeding entirely too slowly(p.4.). A new dynamic trigger circuit (see Diagram 1, p.5) has been developed by the Institute of Exact Mechanics and Computing Technique. The operation of the device is described. It is reported that various modifications of this dynamic trigger have also been developed. The author claims that in comparison with the known dynamic trigger circuits with delay lines or elements of the type used in the IBM- 701 machine, some systems which have been developed in the USSR, such as the one described by him, are superior in that they can perform a number of operations asynchronously with respect to the synchronizing impulses.

Call Nr: QA76.L4 1956 a

Electronic Calculating Machines (Cont.)

Other recent developments are discussed: for example, a very simple binary sum circuit with trigger cells (see Diagram 2a, p.8) and a sum circuit consisting of logical elements (Diagram 2 b, p.8). The Institute of Exact Mechanics and Computer Technique has developed a ferrite memory storage unit of the type Z. The precision production of sufficiently thin crystals (0.1 mm thick) uniformly homogenous throughout, and with an area of several square centimeters is a problem which remains to be solved. Once the technique of growing single crystals of $BaTiO_3$ has been mastered, it will be possible to construct extremely small, quick action memory storage units which are reliable in operation and have low power requirements. The advantages and utilization of seignetto-electric materials are

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Electronic Calculating Machines (Cont.) Call Nr: QA76.L4 1956 a

discussed (p.17). Increasing the speed of the operating elements is one of the outstanding design and engineering problems which has to be solved before computers can be improved. Some of the most promising ways of solving this problem are discussed (p.19).

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LEBEDEV, S.

Epp.
.R91641

Elektronnyye vychislitel'nyye mashiny (electronic calculation machines) Moskva, izd-vo akademii nauk SSSR, 1956.

46 p. Illus., Diagrs., Tables.

At head of title: Akademiya nauk SSSR. Nauchno-populyarnaya seriya.

Lebedev, S. A.

USSR/ Electronics - Conferences

Card 1/1 Pub. 124 - 7/28

Authors : Lebedev, S. A., Academician

Title : Electronic computers and data analyzers

Periodical : Vest. AN SSSR 26/1, 48-49, Jan 1956

Abstract : Minutes are presented from the International Conference on Electronic Computers and Data Analyzers held in October 1955, in Darmstadt, West Germany. Brief mention is made about the Munich computer PERM, the Darmstadt machine DERA and the Soviet high-speed electron computer BESM which is installed in the physico-math. department of the Academy of Sciences, USSR. Illustration of the BESM at the Academy of Sciences USSR is included.

Institution : .....

Submitted : .....

SOV/25-58-11-2/44

AUTHOR: Lebedev, S.A., Academician

TITLE: Mathematical Machines (Mashiny-matematiki)

PERIODICAL: Nauka i zhizn', 1958, Nr 11, pp 5-6 (USSR)

ABSTRACT: Since 1951, S.A. Lebedev has supervised the most important tasks of the Institut tochnoy mekhaniki i vychislitel'noy tekhniki AN SSSR (The Institute of Precision Mechanics and Computing Techniques, AS USSR). In 1950, he was awarded the Stalin Prize for designing and introducing the method of compounding power generators. The author gives in the article his viewpoint on the future development and use of rapid action electronic mathematical machines. The efficient operating time of the computer BESM has been increased from 72 to 75 %. At present, the fast electronic computing machine "BESM-2", an improved model of "BESM-1", is being assembled in the Institute. This latest model has an operative memory for 2,046 figures, twice as much as "BESM-1". The external memory of "BESM-2" consists of 2 magnetic drums and 8 tape recorders with ribbons. The drums have a capacity of 10,240 figures. On each drum 80C figures can be written per second. The magnetic ribbons have an approximate capacity of 120,000 figures. The author mentions the necessity to

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adopt standardization methods in the construction of computing machines and to design individual machines composed of identical parts.
There are 2 photos.

ASSOCIATION: Institut tochnoy mekhaniki i vychishtel'noy tekhniki, AN SSSR (The Institute of Precision Mechanics and Computing Techniques, AS USSR)

LEBEDEV, S.A., inzh.; ANTIPIN, V.V., inzh.; MYAGKOV, Yu.A., inzh.

Determining the quantity of ash and residue in furnaces by means of nomograms. Energetika 8 no.3:8-9 Mr '60. (MIRA 13:6)

(Nomography (Mathematics)) (Furnaces)

NESTERENKO, A.D., otv.red.; LEBEDEV, S.A., akademik, red.; TETEL'BAUM, S.I., red.[deceased]; TSUKERNIK, L.V., kand.tekhn.nauk, red.; MILYAKH, A.N., kand.tekhn.nauk, red.; KHRUSHCHOVA, Ye.V., kand. tekhn.nauk, red.; KISINA, I., red.izd-va; YEFIMOVA, M.I., tekhn.red.

[Problems in magnetic measurements] Voprosy magnitnykh izmerenii. Kiev, 1959. 117 p. (MIRA 12:8)

1. Akademiya nauk USSR, Kiyev. Institut elektrotekhniki.
2. Chlen-korrespondent AN USSR (for Nesterenko, Tetel'baum).
(Magnetic measurements)

LEBEDEV, Sergey Alekseyevich, and SULIM, K.

"A New Computing Machine,"

report submitted, but not presented at the Intl. Conference on Information Processing Paris, 15-20 June 1959.

B-3,135,065; 24 Jul 57

PHASE I BOOK EXPLOITATION SOV/3769

Lebedev, Sergey Alekseyevich, Academician, and Vladimir Andreyevich Mel'nikov

Elektronnaya tsifrovaya vychislitel'naya mashina BESM. [vyp.] 1: Obshcheye opisaniye BESM i metodika vypolneniya operatsiy (The Electronic Digital Computer BESM /High-Speed Electronic Computer/. No. 1: General Description of the BESM and Operation Methods) Moscow, Fizmatgiz, 1959. 208 p. 15,000 copies printed.

Ed. (Title page): S.A. Lebedev, Academician; Ed. (Inside book): Yu.M. Bezborodov; Tech. Ed.: S.N. Akhlamov.

PURPOSE: This book is intended for personnel of computing centers. It will also be of interest to students and scientific workers in computational mathematics.

COVERAGE: This book is the first volume of a 3-volume work on the BESM(High-Speed Electronic Computer) which was designed by the Institute of Precision Mechanics and Computing Engineering of the Academy of Sciences of the USSR. This volume provides a general description of the machine and its operating principles. Basic parameters of the machine as well as the mathematical basis of its

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operation are given. A structural flow diagram is given and the interrelation between the basic units of the machine is explained. The arithmetical, control, input, and output units are described. An Appendix contains a list of abbreviations used. Volume II will provide a more detailed description of the arithmetical and other units. Volume III will treat in detail the memory units. No personalities are named. No references are given.

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LEBEDEV S.A.

28(2) PHASE I BOOK EXPLOITATION SOV/2675

Moscow. Dom nauchno-tekhnicheskoy propagandy im. F. E. Dzerzhinskogo

Vychislitel'naya tekhnika i yeye primeneniye (Computation Technique and Its Application) Moscow, Gosenergoizdat, 1959. 391 p. (Series: Obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy RSFSR) 5,000 copies printed.

Ed. (Title page): S. A. Lebedev, Academician; Ed. (Inside book): V.I. Savel'yev; Tech. Ed.: G. I. Matveyev.

PURPOSE: This collection of articles is intended for scientific, engineering and technical personnel engaged in research, design and operation of digital and analog computers. It may also be used by students of vuzes specializing in computers.

COVERAGE: The authors present fundamentals of digital computers, their elements and units such as arithmetic units, internal and external memory and control devices. They discuss the possibility of constructing computers using semiconductor elements and consider the fundamentals in the theory of logical circuits. They also discuss problems of programming and explain the operation of analog computers and their elements. Brief discussion of mathematical instruments is also presented. The articles were presented at a computer semi-

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nar arranged by Moskovskiy dom nauchno-tekhnicheskoy progagandy imeni F. E. Dzerzhinskiy (Moscow Center for Scientific and Technical Propaganda imeni F. D. Dzerzhinskiy) in 1957. No personalities are mentioned. References appear at the end of some articles.

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Lebedev, S. A., Academician. Electronic Digital Computers 5
The author presents a general discussion of electronic digital computers. He describes their operation and areas of application and considers prospects for further development. There are no references.

Artamonov, G. T., Engineer. Problem Programming and Reducing Mathematical Operations to a Form Suitable for Digital Computers 17
The author discusses methods of representing numbers in computers and performing arithmetical, logical and control operations. He also presents an example of solving a complex problem and presents methods of checking computer accuracy. There are 2 references, both Soviet.